LOMATIUM BRUNSFELDIANUM: A NEW SPECIES OF *LOMATIUM* (UMBELLIFERAE) FROM NORTHERN IDAHO

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ABSTRACT

Lomatium brunsfeldianum Kemper & R.P. McNeill is a new species described from four populations in Idaho: the Lochsa River Canyon, North Fork of the Clearwater River Canyon, St. Joe River Canyon, and along the Couer d'Alene River. It is morphologically most similar to *Lomatium bicolor* var. *bicolor* and *L. grayi* var. *grayi*. It can be distinguished from *Lomatium bicolor* var. *bicolor* by the wide geographical separation, distinctive umbel structure, root morphology, and different habitat, and can be distinguished from *Lomatium grayi* var. *grayi* by the characters of the mericarps, papillae in the umbel, root structure, and ecological separation. *Lomatium brunsfeldianum* occurs congruently with *Lomatium ambiguum* and *Lomatium dissectum* var. *multifidum*, but is easily distinguishable from either based on morphology.

RESUMEN

Lomatium brunsfeldianum Kemper y R.P. McNeill es una nueva especie descrita de cuatro poblaciones en Idaho: el Cañón Lochsa Rivera, North Fork del Cañón del río Clearwater, Cañón del río St. Joe, y a lo largo del río Coeur d'Alene. Es morfológicamente muy similar a *Lomatium bicolor* var. *bicolor* y *L. grayi*. Se puede distinguir de *Lomatium bicolor* var. *bicolor* por la separación geográfica amplia, distinta estructura de la umbela, morfología de la raíz, y hábitat diferentes, y se puede distinguir de *Lomatium grayi* var. *grayi* por los caracteres de los mericarpos, las papilas de la umbela, estructura de la raíz, y la separación ecológica. *Lomatium brunsfeldianum* aparece en congruencia con *Lomatium ambiguum* y *Lomatium dissectum* var. *multifidum*, pero es fácilmente distinguible de cualquiera por su morfología.

KEY WORDS: New Species, *Lomatium*, Umbelliferae, Apiaceae, Idaho, Northern Rocky Mountains, Endemic

Lomatium brunsfeldianum Kemper & R.P. McNeill, sp. nov. (**Figs. 1–5**). TYPE: UNITED STATES. IDAHO. Idaho Co.: Blackrock Canyon, Lochsa River, ca. 0.4 mi E of Split Cr. along HWY 12, on rock out crop, ca. 1800 ft (046°121'16.33"N, 115°24'10.85"W), 30 May 2003, *Kemper 93* (HOLOTYPE: ID).

Lomatium bicolor (S. Watson) J.M. Coult. & Rose var. *bicolor*, Contr. U.S. Natl. Herb. 7:237. 1900. *Peucedanum bicolor* S. Watson, Bot. King Surv. 129. 1871. *Cogswellia bicolor* (S. Watson) M.E. Jones, Contr. W. Bot. 12:33. 1908.

Lomatium brunsfeldianum differs from congeners by geographical and/or ecological separation, umbel structure, root morphology, and leaf size and structure.

Plantae perennes, caule, 37–86 cm procerae ubi maturae. Radix cylindracea, carnosa, ramosa, caudice simplici vel ramoso. Caulis uno ad aliquot, deliquescenes, nervocaulis, glabri ad dense papillosi, 10–30 cm longi. Folia uno ad aliquot per caulis, trullata, alterna, basilia et caulina, glaberi ad dense papillosi, ternato-pinnati dissecti, bis ad sexies divisi, 13–33 cm longi, 17–48 cm lati; petioli amplexicauli; segmentis ultimis 30–71 per cm^2, filiformibus vel linearibus; apicibus subtiliter mucronatis, 0.73–4.12 mm longis, 0.14–0.62 mm latis. Scapi 1–2, 4.4–40.1 cm longi. Inflorescentia umbella composita, spara ad dense papillousa; radiis 5–16, papillosis, effusis, 1.2–12.8 cm longis; pedicellis 4–19, caespitosis 2.9–10.1 mm longis; involucrum absens; bractis minores ex involllucelli ± praesentibus, descretis, filiformibus vel linearibus, ut maximun 4 mm longis, ut maximum 0.2 latis. Flores sepali 5, connatis, inconspicuous; petali flavis, obcordatis; filo flavis, complantanis; antheris 2, flavis, exsertis. Mericarpia anguste elliptica, dorsaliter compresa, 10.75–15.63 mm longa, 3.06–4.61 mm lata; alibus lateralibus 0.29–0.99 mm latis; vittis intervallis 1–2, commissuris 2–6, ± obscuribus vel incompletibus; stylopodia luteola, laevia at paleaceoa; carpophorum luteolum 9–14 mm longum. Florescentia March per June. Plantae occupanes sitibus humidis, petrosis.

Plants caulescent perennial, 37–86 cm tall at maturity; **root** cylindric, fleshy, branched, simple to branched caudex. **Stems** 1-several, deliquescent, shallowly corrugated, glabrous to densely papillate, 10–30 cm long. **Leaves** 1-several per stem, alternate; **petiole** sheathing stem; **blades** trullate, glabrous to densely papillate, ternate-pinnately dissected, 2–6 times divided, 13–33 cm long, 17–48 cm wide; **ultimate segments** 30–71 per 1 cm^2, filiform or linear, with mucronulate apices, 0.73–4.12 mm long, 0.14–0.62 mm wide. **Scapes** 1–2, 4.4–40.1 cm long. **Inflorescence** compound umbel, sparsely to densely papillate; **involucre** absent; **rays** 5–16,

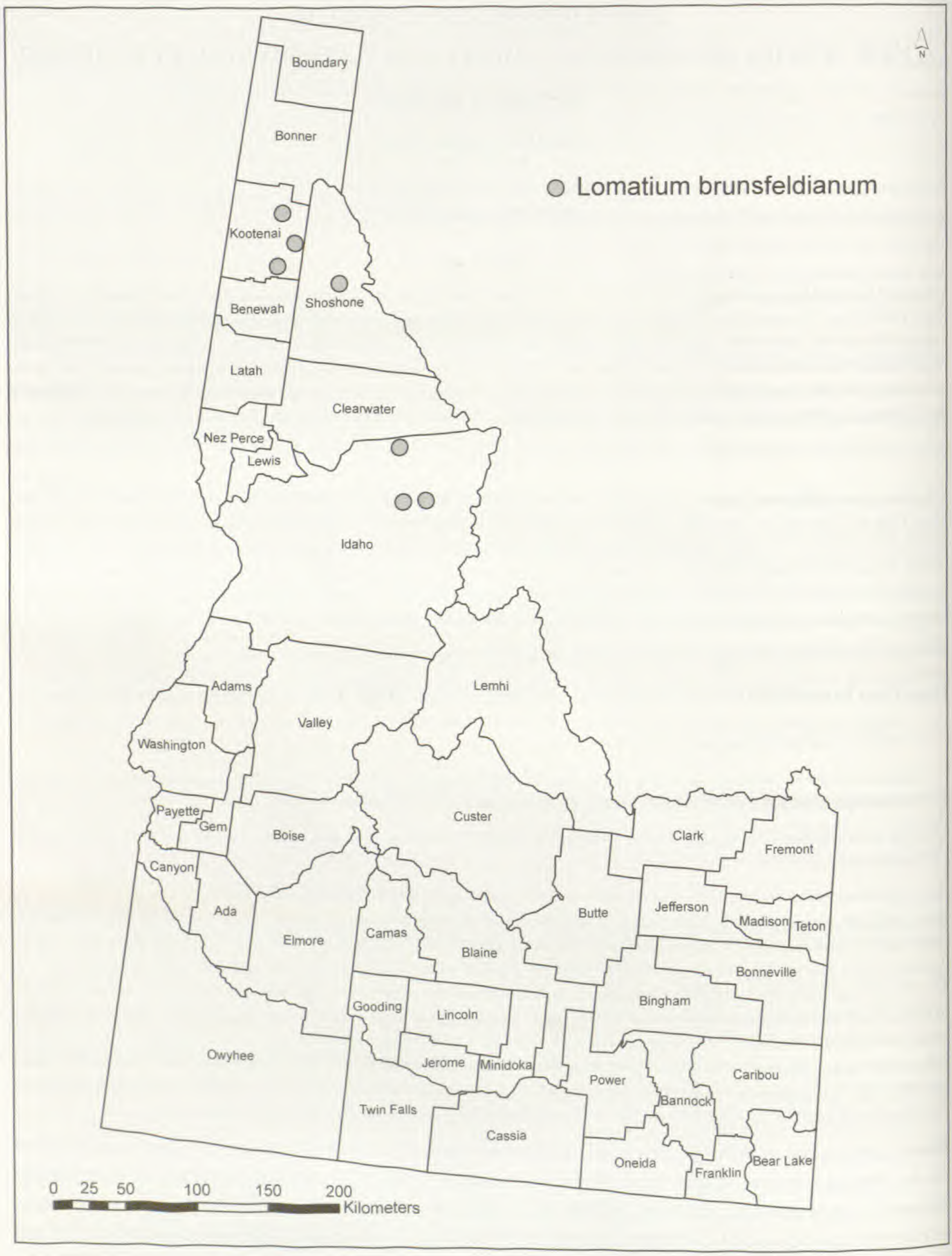

Fig. 1. Geographic range of *Lomatium brunsfeldianum*.

Fig. 2. *Lomatium brunsfeldianum*. A. Large plant, notice three dimensional nature of leaves. B. Divaricate rays of the umbel. C. Same plant as A showing rocky habitat. D. Filiform ultimate segments. E. Branching root. F. Small plant with old stems and umbels.

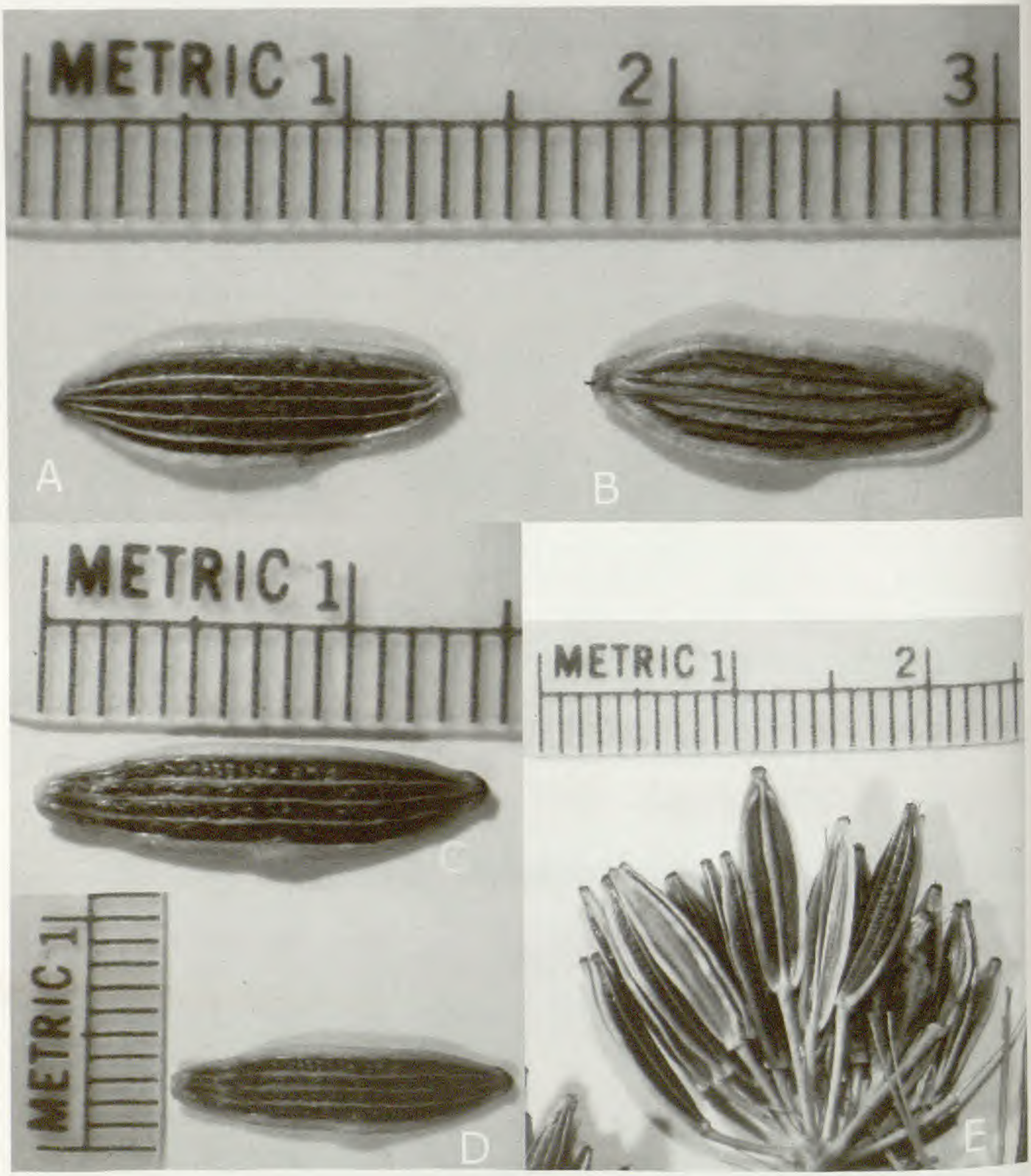

FIG. 3. *Lomatium brunsfeldianum*. A. Mericarp, dorsal view with five vittae, one in each interval. B. Mericarp, commissural view with six vittae, three of which are incomplete. C. Mericarp, dorsal view with four vittae, one in each interval. D. Mericarp showing width. E. Umbellet with mericarps and carpophore.

papillate, divaricate, 1.2–12.8 cm long; **pedicels** 4–19, caespitose, 2.9–10.1 mm long; **involucel bractlets** ± present, free, linear or filiform, up to 4 mm long, up to 0.2 mm wide. **Flowers sepals** 5, connate, inconspicuous; **petals** 5, yellow obcordate; **anthers** 2, yellow, exserted; **filaments** flattened, yellow; **superior ovary**, carpel 2, styles 2. **Mericarps** narrowly elliptic, deplanate, 10.75–15.63 mm long, 3.06–4.61 mm wide, lateral wings 0.29–0.99 mm wide; **vittae** interval 1–2, commissural 2–6, may be obscure, or incomplete; **stylopodia** yellow, smooth to paleaceous; **carpophore** yellow, 9–14 mm long. Flowering March through June. Occurring on wet rocky outcrops and talus slopes.

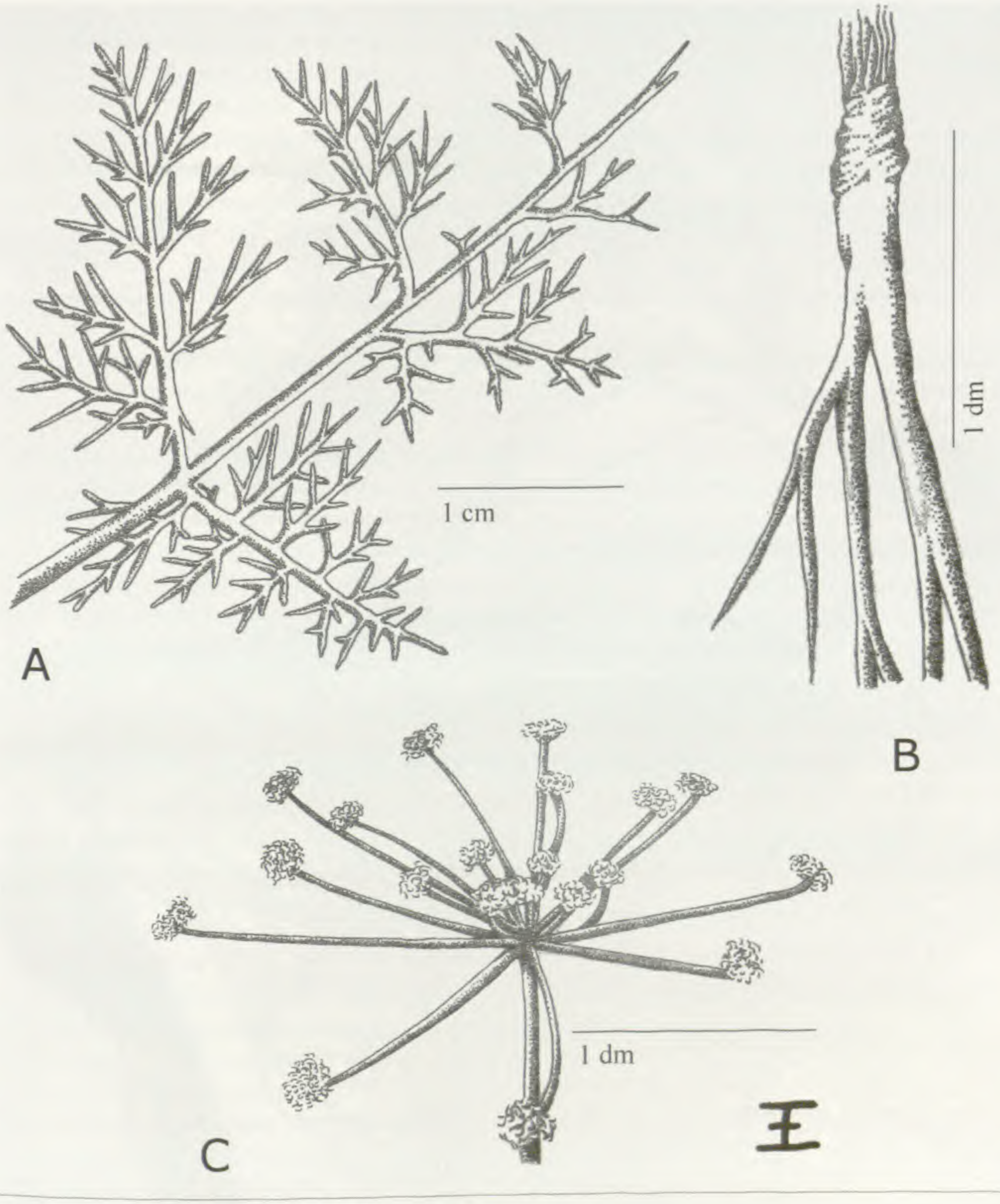

FIG. 4. *Lomatium brunsfeldianum*. A. Leaf structure. B. Root and caudex. C. Umbel structure.

Additional specimens examined: **U.S.A. IDAHO. Idaho Co.:** Blackrock Canyon, Lochsa River, ca. 0.4 mi E of Split Cr. Along HWY 12, on rock out crop, ca. 1800 ft (046°121'16.33"N, 115°24'10.85"W); 30 May 2003, *Tyson Kemper 93* (ID); North Fk. Clearwater River, SSW facing cliff complex adjacent to road, some seepy spots (046°50.422'N, 115°33.317'W; 046°39.080'N, 115°31.881'W); 16 Jun 2004, *Tyson Kemper 266* (ID); Clearwater Range Just S of mouth of Tumble Creek W of Lochsa River, E aspect (T34N R8E SW ¼ of the SE ¼ Sec. 25), 24 May 1993, *Karen Gray 27* (ID). **Kootenai Co.:** growing on mossy rock out-crops NW side of Rose LK (N 047°33.586', W 116°27.641'); 23 June 2004, *Tyson Kemper 287* (ID); rock cliff complex on Rd. 108 ca. 7 mi E of Couer d'Alene SSE aspect (N 047°42.957', W 116°40.082'); 23 Jun 2004, *Tyson Kemper 288* (ID); W margin of Rose Lake Bog, growing on a dry mossy cliff immediately above West Shore Rose Lake Road, 17 Jul 2002, *Curtis R. Bjork 6481* (ID). **Shoshone Co.:** Couer d'Alene River, SE aspect growing in rock out crop along road cut in cracks and in steep loose rocky soil (N 047°37.225', W 116°12.833'); 24 Jun 2004, *Tyson Kemper 308* (ID)

Fig. 5. *Lomatium brunsfeldianum*. Two pressed specimens from the Lochsa River Canyon.

Etymology.—The specific epithet commemorates Dr. Steven J. Brunsfeld's contributions to the fields of botany and education.

Distinctive landforms and geomorphic processes in conjunction with large-scale processes of climate change have resulted in unusual patterns of plant distribution in the Northern Rocky Mountains of the U.S.A.

Consequently, it is home to many rare and endemic species, and many disjunct populations of species that are normally distributed either west of the Cascade Mountains or east of the Rocky Mountains (Brunsfeld et al. 2001). In 2003, an anomalous population of *Lomatium* was discovered in the Lochsa River Canyon by Tyson Kemper. Additional populations were later found on the North Fork of the Clearwater, St. Joe and Couer d'Alene rivers. It was not possible to key specimens from these populations reliably in the Flora of the Pacific Northwest or the Intermountain Flora (Cronquist et al. 1994; Hitchcock et al. 1961). Morphologically specimens from these populations were found to be somewhat similar to both *Lomatium bicolor* (S. Watson) J.M. Coult. & Rose var. *bicolor and L. grayi* (J.M. Coult. & Rose) J.M. Coult. & Rose var. *grayi* (Fertig 2000). It was concluded, however, that differences in morphology, ecology, and/or geography were significant enough that these populations should be recognized as a new species, *L. brunsfeldianum*. The characters distinguishing *L. brunsfeldianum* from *L. bicolor* var. *bicolor* and *L. grayi* var. *grayi* are discussed below.

The morphological characters of *Lomatium brunsfeldianum* easily distinguish it from other *Lomatium* species, with the exceptions of *L. bicolor* var. *bicolor*, and *L. grayi* var. *grayi*. *Lomatium bicolor* var. *bicolor* is similar in leaf structure, and mericarp size and shape. It also has overlap in all of the size measurements with *L. brunsfeldianum*, but with a much smaller statistical mean. There are four main characters that allow the two species to be separated. The most obvious is the large separation in geographical range. There is approximately 400 km separation between the known occurrences of the two taxa. The root structure is also very different; *L. bicolor* var. *bicolor* has moniliform, globose, or tuberous roots that are un-branched and somewhat woody, while *L. brunsfeldianum* has cylindric, fleshy roots that may have multiple branchings (Harris & Woolf Harris 2003). *Lomatium brunsfeldianum* occurs on rocky outcrops and talus slopes, which is very different from the wet meadows and high clay content soils of *L. bicolor* var. *bicolor* habitat. *Lomatium brunsfeldianum* has a very distinctive umbel structure with numerous (5–16), long (12–127 mm), divaricate rays, while *L. bicolor* var. *bicolor* has fewer (2–9), shorter (7–81 mm), caespitose rays. When Schlessman (1984) described *L. bicolor* var. *bicolor*, he included some samples of *L. brunsfeldianum* as *L. bicolor* var. *bicolor*. There were few specimen of *L. brunsfeldianum* collected at that time, which made it difficult to separate from *L. bicolor* var. *bicolor*. *Lomatium grayi* var. *grayi* is distinguished from *L. brunsfeldianum* by the structure and size of the mericarps, a stout taproot, lack of papillae in the umbel, and it is essentially acaulescent, with the leaves apparently basal, while *L. brunsfeldianum* is caulescent. *Lomatium grayi* occurs on sites that are much dryer than sites where *L. brunsfeldianum* is found and generally at lower elevations in north Idaho. *Lomatium bicolor* var. *leptocarpum* is very different from *L. brunsfeldianum*, with the only similarity being the mericarps. It has been considered in this paper because it is the only variety of *L. bicolor* that occurs in north Idaho.

Lomatium brunsfeldianum has only been found in four deep river canyons of northern Idaho: the Lochsa River Canyon, the North Fork of the Clearwater River Canyon, the St. Joe River Canyon, and the Couer d'Alene River Canyon (see Fig. 1). *Lomatium brunsfeldianum* occurs only on moist rocky outcrops, talus slopes, and soil at the base of cliffs in the river valleys and canyons in the mesic cedar/hemlock forest of northern Idaho between 480–1800 m in elevation. The soil it occurs on in the St. Joe River canyon was classified as an Udorthent, which are young well-mixed soils with no horizon development, a high portion of rock fragments, a low clay fraction, and an udic moisture regime (Soil Survey Staff 2003). The sites where it occurs have a south aspect and are possible ground water discharge areas. *Lomatium brunsfeldianum* flowers from March to early June and the fruit matures in late June through August with timing largely dependent on elevation and exposure. *Lomatium brunsfeldianum* occurs in association with the following species: *Alnus rubra* Bong., *Amelanchier alnifolia* (Nutt.) Nutt. ex. M. Roem., *Centaurea stoebe* L. ssp. *micranthos* (Gugler) Hayek, *Claytonia cordifolia* S. Watson, *Collinsia parviflora* Lindl., *Fragaria vesca* L., *Holodiscus discolor* (Pursh) Maxim., *L. ambiguum* (Nutt.) J.M. Coult. & Rose, *L. dissectum* (Nutt.) Mathias & Constance var. *multifidum* (Nutt.) Mathias & Constance, *Mimulus clivicola* Greenm., *M. guttatus* DC., *Orobanche fasciculata* Nutt., *Penstemon wilcoxii* Rydb., *Philadelphus lewisii* Pursh, *Pinus ponderosa* C. Lawson, *Poa bulbosa* L., *Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii*, and *Sedum stenopetalum* Pursh.

Lomatium brunsfeldianum is endemic to the Northern Rocky Mountains of Idaho and should be consid-

ered for listing as a sensitive or threatened species due to its limited geographic range. It occurs on the north side of river drainages, which is also where most of the major roads are located. This puts *L. brunsfeldianum* at risk in a number of ways: encroachment by invasive species introduced by the initial road building and spread by current road maintenance and traffic, habitat destruction caused by additional road building, and eradication through herbicide application. Future efforts should focus on a more thorough mapping of this and other plant species in Idaho and integration of this data into management plans.

1. Involucel bractlets absent.
   2. Ultimate segments leaf-like, narrowly trullate to narrowly obtrullate, 1–20 per cm^2, 0.5–54 mm long, up to 5 mm wide, scapes 1–8(–13) ____ **L. ambiguum**
   2. Ultimate segments not leaf-like, filiform, more than 20 per cm^2, 0.7–5.5(–7) mm long, 0.1–0.7 mm wide, scapes 1–4.
      3. Roots cylindric, fleshy, branched, pedicels 2.9–10.2 mm long, rays divaricate ____ **L. brunsfeldianum**
      3. Roots tuberous thickened, globose, moniliform, or elongate thickened, pedicels 0.7–3.5 mm long, rays caespitose or ascending ____ **L. bicolor** var. **bicolor**
1. Involucel bractlets present.
   4. Ultimate segments very numerous, several hundred to several thousand, terete in cross section, involucel bractlets dimidiate, strong carrot or celery odor ____ **L. grayi** var. **grayi**
   4. Ultimate segments less numerous, rarely more than 150, flat, involucel bractlets various, but not dimidiate, no strong odor.
      5. Plants 5–15(–20) dm tall, pedicels 4–20 mm long, mericarps 4.5–10 mm wide, large woody taproot ____ **L. dissectum** var. **multifidum**
      5. Plants less than 5 dm tall, or if more than 5 dm then pedicels 3.5 mm or less long, or roots cylindric, fleshy and branched.
         6. Roots cylindric, fleshy, branched, pedicels 2.9–10.2 mm long ____ **L. brunsfeldianum**
         6. Roots tuberous thickened, globose, moniliform, or elongate thickened, pedicels 0.7–3.5 mm long.
            7. Ultimate segments not leaf-like, filiform, 21–110 per cm^2, (0.3–)0.9–5.5(–7) mm long, 0.2–0.6 mm wide ____ **L. bicolor** var. **bicolor**
            7. Ultimate segments leaf-like, narrowly oblong, narrowly trullate, or narrowly elliptic, 4–34 per cm^2, (0.25–)0.9–19.5 mm long, 0.2–1.5mm wide ____ **L. bicolor** var. **leptocarpum**

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